



# Forensic Toxicology: Advances in the Identification of New Psychoactive Substances (NPS)

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## Keywords

Forensic Toxicology; New Psychoactive Substances

## Abbreviations

NPS: New Psychoactive Substances; HRMS: High-Resolution Mass Spectrometry.

## Introduction

New Psychoactive Substances is one of the biggest challenges for forensic toxicology. Artificially manufactured drugs that are aimed at mimicking the effects of substances that are under legal regulations commonly present unique challenges regarding identification and detection. Since NPS is a fast-emerging environment, forensic toxicologists will always be coming up with new methods and technologies for mitigation.

## The Emergence of Novel Psychoactive Substances

NPS, also known as “designer drugs,” are chemically altered analogues of known substances such as cannabis, cocaine, or opioids. They have developed mechanisms to avoid detection approaches commonly used for traditional illicit drugs. With their fast rate of appearance and wide variations of chemical structures, the task to identify these drugs becomes much more challenging using traditional toxicological methods [1-3].

With increasing popularity, NPS poses grave public health issues. NPS are sold until new regulations catch up with the chemical makeup; they are sold as legal alternatives to illegal drugs. It is a critical focus for forensic professionals

who have to change their methods to keep pace with constant changes [3].

## Challenges with Identification

In many cases, the identification of NPS through conventional forensic toxicology methods, such as GC-MS and LC-MS/MS, often proves to be insufficient, since NPS have highly diverse structures, which could lead to their exclusion from the parameters of currently established detection panels [12].

Moreover, NPS are usually designed to avoid legal restrictions, making them even more difficult to detect with standard testing. This has put a lot of pressure on forensic toxicologists, who have to constantly update their methods to keep up with these ever-changing substances [1-3].

## Advanced Screening Approaches for NPS

To face these challenges, new and improved screening methods are being developed by forensic toxicologists:

**High-Resolution Mass Spectrometry (HRMS):** This technology enhances the detection of NPS through detailed chemical compounds at trace levels. HRMS allows forensic scientists to detect a wider range of substances, even those with a structural similarity to other drugs [2].

**Metabolomic Profiling:** The human body metabolizes NPS variably, which can be interrogated through metabolites investigated in biological fluids. In this respect, more specific tests could be developed by forensic scientists to identify NPS that otherwise result in undetectable parent compounds [12].

**Chromatographic and Spectroscopic Methods:** Advances in chromatography, coupled with modern spectroscopic techniques, increase the ability of the forensic lab to

separate and identify NPS more precisely in biological fluids. The combination of these methods has great potential for detecting a greater variety of synthetic drugs [2].

**Development of NPS Screening Panels:** As the scope of NPS expanded, scientists contributed to the development of wider screening panels. These panels are expected to detect not only traditional illicit drugs but also emerging synthetic drugs. This could increase the capacity of forensic labs to trace the ongoing dynamic NPS market [3].

### Legal and Social Implications

Fast NPS development creates legal obstacles as well. New drugs are more likely to appear in the gray area most of the time. A cooperative effort will be required by the law and forensic science to define legal frameworks which might promptly respond to the newly discovered substances when these involve any crime or overdose death case [3]. Moreover, the unpredictable effect of NPS and its toxic nature poses a rising threat to public health. Accurate and prompt identification of such substances in overdose or poisoning cases is very much necessary for protecting public health [2,3].

### The Way Forward

The fight against NPS must be ongoing and collaborative between forensic toxicologists, law enforcement, and policymakers. More sensitive screening methods should be developed, extensive NPS databases created, and technologies for detection improved to stay ahead of this evolving drug market quickly [2,3].

Therefore, the forensics scientists' education and training programs are expected to be aligned with these developments. In this way, the workforce will be geared up toward facing the challenges of NPS detection. In this connection, forensic toxicology will continue to provide useful information toward delivering criminal investigations and public health safety.

### Conclusion

Forensic toxicology is at a crossroads with the rise of NPS. While traditional detection methods have their limits, emerging technologies such as high-resolution mass spectrometry, metabolomics, and advanced chromatographic techniques are providing new solutions. As the NPS market continues to evolve, these advancements are vital in improving the reliability and speed of forensic toxicology tests, helping to protect both public health and the integrity of the criminal justice system.

### References

1. Gabler M, McKinney P (2023) Progress in Identifying Novel Psychoactive Substances within the Field of Forensic Toxicology. *Journal of Forensic Sciences*.
2. Harrison M (2024) Challenges in Forensic Toxicology: New Psychoactive Substances. *Forensic Toxicology Review*.
3. Chen L, Zhao P (2024) Metabolomics in Forensic Toxicology: An Emerging Frontier for the Detection of New Psychoactive Substances. *Forensic Science International*.